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# Intercomparison of two meteorological models, COSMO and WRF, for verification of QPF over Italy

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Objective verification is an important and basic instrument to evaluate and analyze the quality of meteorological model outputs. In particular it is a valuable tool for assessing QPF (Quantitative Precipitation Forecast) quality with respect to severe weather events. On the other hand objective verification allows a better understanding of models' behaviour in different meteorological situations and helps in the evaluation of the reliability of model forecasting average and maxima values both for short and long forecast ranges.
Therefore the aim of this work is to compare the behaviour with respect to QPF of two Limited Area Models (LAM): COSMO, developed in the framework of the COSMO Consortium and WRF-NMM, developed at NOAA-NCEP (see www.cosmo-model.org and www.wrf-model.org respectively for a comprehensive description of the models and their related development activities). Both models run operationally with 7 km horizontal resolution and with initial and boundary conditions from ECMWF Global Circulation Model (GCM). The verification has been carried out using more than 1300 rain gauges distributed over the 90 italian warning areas designed for civil protection purposes according to climatological and meteo-hydrological criteria. Models' skills and scores have been calculated comparing the recorded and forecasted 24 hours cumulated precipitation value in order to estimate the models behaviour in term of underestimation/overestimation, accuracy in space-time detection and capability of correctly predict high and low amounts of rainfall.
In particular, it has been studied the seasonal evolution of the model with classical statistical indexes referred to the first and second day of forecast (+24h and +48h respectively). In order to evaluate if the performances of the two models are statistically different, it has been adopted an approach based on testing hypothesis (see for instance Hamill, 1999) in which a confidence interval has been built for the performance differences (as suggested in Joliffe, 2007). Moreover the spatial distribution of the indexes over the Italian warning areas has been investigated.